

## ABSTRACT

According to exemplary embodiments of the present invention, a fracture prediction device for a spot welded portion can be provided. For example, the device may include an input arrangement configured to input all or some of a material strength, a plate thickness, a nugget diameter of a spot welding, a plate width of a joint, and a rotation angle of the joint in a tension test, based on a cross tension test and/or a shear tension test at a spot welded joint. The device can also include a first calculation arrangement configured to calculate a fracture strength parameter of the spot welded portion from all or any of the material strength, the plate thickness, the nugget diameter of the spot welding, the plate width of the joint, and the rotation angle of the joint in the tension test. A parameter storage arrangement may also be provided which can be configured to store the fracture strength parameter by each steel type. Further, the device may further have a second calculation arrangement configured to determine a fracture of the spot welded portion by installing the fracture strength parameter stored in the parameter storage arrangement into a fracture prediction formula in which a deformation at a periphery of the spot welding is modeled by a finite element procedure. Exemplary embodiments of the method software arrangement and computer accessible medium performing similar procedures can also be provided.

**[0048]** FIG. 4 is a view schematically showing a method to calculate the fracture limit load by using a graph based on experimental data, in addition to the method to calculate the fracture limit load by using the formulas such as formula (1), formula (2), formula (3), and formula (5), formula (6), or the formula (3m), formula (3m2), formula (3m3), and formula (3m4) instead of the formula (3). The fracture limit loads can be measured by the test in which the " $\delta/W$ " is varied and when it is graphed, the fracture load strength curves can be written in various curvilinear relations depending on the material strength TS.